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A Survey on Routh-Hurwitz Stability Criterion

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Abstract : Routh-Hurwitz stability criterion is a powerful approach to determine stability of linear time invariant systems. On the other hand, applying this criterion to characteristic equation of a system, whose stability or marginal stability can be determined. Although the command roots (.) of MATLAB software can be easily used to determine the roots of a polynomial, the characteristic equation of closed loop system usually includes parameters, so software cannot handle it; however, Routh-Hurwitz stability criterion results the region of parameter changes where the stability is guaranteed. Moreover, this criterion has been extended to characterize the stability of interval polynomials as well as fractional-order polynomials. Furthermore, it can help us to design stable and minimum-phase controllers. In this paper, theory and application of this criterion will be reviewed. Also, several illustrative examples are given.

Keywords : Hurwitz polynomials, Routh-Hurwitz stability criterion, continued fraction expansion, pure imaginary roots
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